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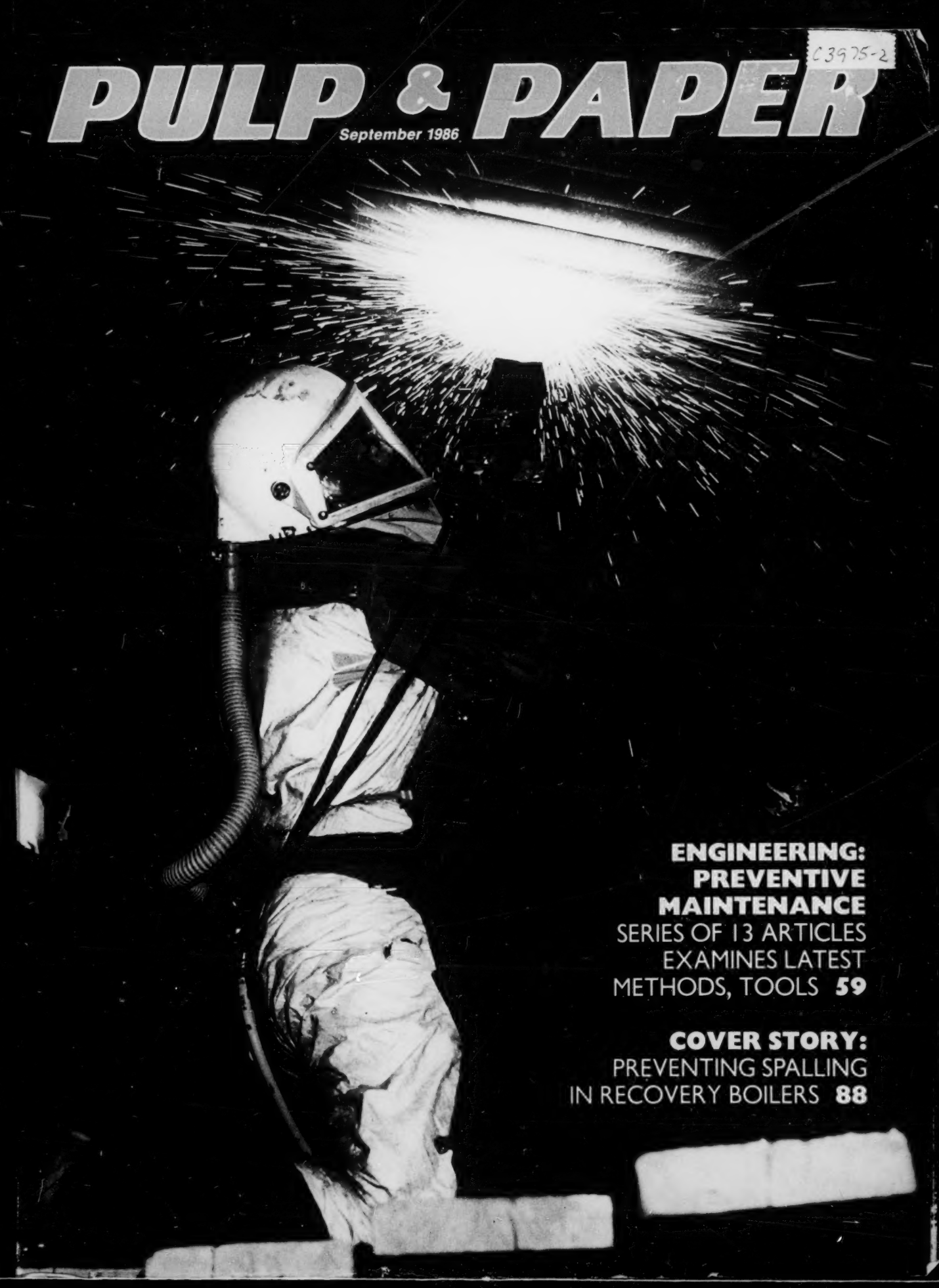
PULP & PAPER

September 1986



ENGINEERING: PREVENTIVE MAINTENANCE
SERIES OF 13 ARTICLES EXAMINES LATEST METHODS, TOOLS **59**

COVER STORY:
PREVENTING SPALLING IN RECOVERY BOILERS **88**

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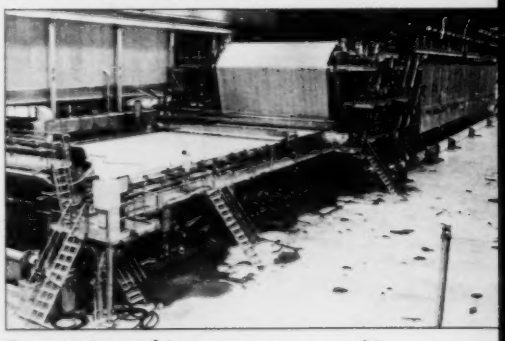

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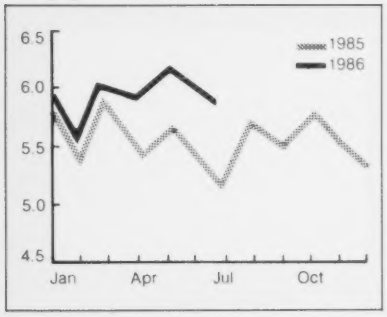
U.S. paper and board production



U.S. production of paper and paperboard in June totaled 5.9 million tons, a gain of 7.2% compared with the same month last year, according to American Paper Institute data. The trend of production continued strong and steady in June at a record 70.5 million tpy, the same as in May. Production for the first half of 1986 was at a seasonally adjusted pace of 70.1 million tpy, also a record rate. The rate of production for the first half was a solid 4.8% higher than 1985 and 2.4% above the previous high reached in 1984.

Among major grades, paperboard continued to lead the way, with bleached and recycled board both up over 8% and the major-tonnage kraft paperboard sector up 6.3% thanks to strong domestic demand and the revival of export markets. Strength in paper was confined mainly to uncoated free-sheet, up 8.2% from depressed levels in 1985. Newsprint continued to make a slow recovery, but coated papers remained weak.

Canadian newsprint shipments jumped 8.9% in June to 806,000 metric tons. Shipments were up only 1.2% for the first six months. Pulp was much stronger, with shipments up almost 10% in June and 12% for the first half. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	June	463	3.1	5582	1.8
Uncoated groundwood (s)	June	122	7.0	1485	0.9
Coated paper (s)	June	506	11.0	6049	−1.8
Uncoated free sheet (s)	June	876	11.2	10430	8.2
Other printing/writing	June	106	−9.4	1363	1.0
Total packaging and other paper (s)	June	417	0.0	5167	−0.8
Tissue	June	421	1.4	5109	3.5
Total paper	**June**	**2911**	**5.5**	**35186**	**2.8**
Unbleached kraft paperboard	June	1508	13.7	17487	6.3
Semichemical medium	June	452	7.9	5301	5.2
Bleached paperboard	June	347	6.8	4302	8.8
Recycled paperboard	June	670	0.3	8230	8.1
Total paperboard	**June**	**2978**	**8.8**	**35320**	**7.0**
Total U.S. paper and paperboard output	**June**	**5889**	**7.2**	**70506**	**4.9**
PULP, WASTEPAPER & FIBER [2]					
Total U.S. woodpulp production	May	4732	4.6	56617	3.8
Market pulp production	May	613	13.1	7313	5.7
Wastepaper consumption at paper/board mills	May	1427	16.7	16490	7.9
Pulpwood consumption (cords)	May	7499	6.0	90864	4.4
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft²)	June	23.419	10.0	139.906[6]	20.1
Containerboard inventories at U.S. box plants and mills	June 1	2373	−18.8		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	May	996	5.4	11267	0.0
Imports of Canadian newsprint	May	727	6.3	8198[6]	−0.6
U.S. paper exports (including products)	May	408	37.4	4661	19.1
Exports of unbleached kraft linerboard	May	193	82.1	2153	31.5
Exports of woodpulp	May	365	18.1	4431	18.5
Norscan pulp inventories[4]	June 30	960	−33.7		
Norscan pulp operating rates[4]	June	94%	89%	97%	90%
CANADIAN STATISTICS [5] *(reported in metric tons)*					
Total newsprint shipments	June	806	8.9	4540[6]	1.2
Operating rates	June	94%	89%	93%	94%
Inventories held by U.S. consumers	June 30	1372	−7.0		
Other paper/board shipments	June	487	12.0	2975	9.7
Woodpulp shipments (export only)	June	680	9.7	3842[6]	12.0
Operating rates	June	95%	96%	92%	88%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

UNCOATED GROUNDWOOD PAPERS: U.S. producers feel competition from Canada, LWC oversupply

Grade structure: Uncoated groundwood papers can be considered value-added newsprint—the physical properties have been enhanced by superior brightness and smoothness. At the higher end of the spectrum, supercalendering adds a finish, allowing these papers to compete with lightweight coated (LWC) groundwood papers in the marketplace. Typically, brightness levels range from 64 to 72 Elrepho compared with 56 to 62 for standard newsprint. Major end uses include Sunday magazines, preprinted inserts, catalogs, directories, and forms. Basis weights range from 20 to 45 lb/3,300 ft².

Production/capacity: Coming off a record year in 1984, U.S. uncoated groundwood paper shipments fell 3.1% to 1.52 million short tons in 1985. Canada experienced another strong year in 1985, with total "official" shipments of 1.14 million short tons, up 14.3%, according to Canadian Pulp & Paper Assn. data.

Because of U.S. tariff nomenclature, a substantial portion of Canada's uncoated groundwood production may be classified in the newsprint category when it enters the U.S. Official estimates of Canadian capacity are therefore believed to be half or even less than half of the actual total.

Swing machines, which can produce either newsprint or groundwood papers in response to changing markets, also make capacity estimates difficult. The Canadian figures shown in the accompanying capacity table are based on estimated actual 1986 production levels.

Outlook: U.S. uncoated groundwood paper shipments through May were running 0.1% below a year ago. Signs indicate that the market will at least hold steady through the end of the year. New orders for U.S. mills have been running 9.9% ahead of a year ago, and backlogs have risen. Advertising forecasts have been revised upward, demand for newspaper inserts remains strong, and increasing competition in the development of regional telephone directories have been boosting demand for the lower-end directory paper grades.

The weak Canadian dollar, however, has enabled Canadian mills to undercut U.S. pricing and may further boost imports from north of the border. But the decline in the U.S. dollar has caused groundwood paper imports from Europe (mainly supercalendered grades) to fall off during the first half.

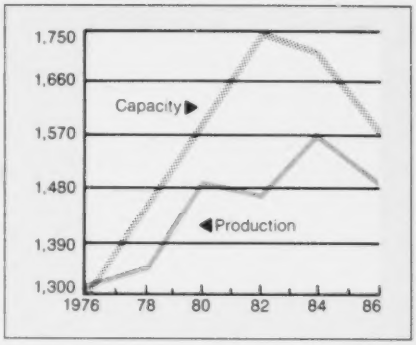
U.S. capacity to produce uncoated groundwood papers will decline slightly this year, although official Canadian capacity will jump 11.5% from 1985. Over the entire 1985-88 period, U.S. capacity will decline 0.6% while Canadian capacity jumps 28%, mainly as the result of machine conversions from newsprint. These figures, however, do not include Lake Superior Paper Industries' 245,000-tpy supercalendered (SC) mill in Duluth, Minn., scheduled to start up in 1988. In addition, a Norwegian company is studying a new 220,000-short-tpy SC mill in Quebec.

Pricing: Another factor causing increased price competition in the U.S. groundwood papers market has been growing oversupply and price weakness in coated paper grades. On the other hand, announced newsprint price hikes, effective in the fall and later, might result in higher pricing for the lower-end groundwood grades. Prices in 1986 will continue to respond to these conflicting pressures.

List prices for some groundwood grades ($/short ton) for 34-lb supercalendered are: 1982, $635; 1983, $638; 1984, $708; 1985, $780; midyear 1986, $740.

Prices for 35-lb offset, 65 brightness are: 1984, $515; 1985, $544; midyear 1986, $535. For 30-lb standard rotonews: 1978, $331; 1979, $371; 1980, $435; 1981, $491; 1982, $508; 1983, $501; 1984, $515; 1985, $510; midyear 1986, $485. ■

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

	1984	1985	1986e
Production[1]	1,565	1,516	1,489
Capacity[1]	1,704	1,644	1,587
Utilization rate	91.8%	92.2%	93.8%
Imports	1,298	1,027	896
Exports	30	37	53
Apparent U.S. consumption	2,833	2,506	2,332
lb/capita	23.91	20.97	19.43
GNP ratio[2]	0.81	0.70	0.63

e = *P&P* estimate.
1. American Paper Institute data.
2. In 1982 constant dollars.

TOP PRODUCERS (000 tpy)

	Annual capacity			Market share
	U.S.	Canada	Total	(%)
1. Abitibi-Price	—	412	412	11.5
2. CIP	—	395	395	11.0
3. Boise Cascade	24	289	313	8.7
4. Con-Bath	—	290	290	8.0
5. GNN	289	—	289	8.0
6. Champion Intl.	286	—	286	8.0
7. MacBlo	—	275	275	7.6
8. Domtar	—	210	210	5.8
9. Madison	200	—	200	5.5
10. CZ	150	—	150	4.2

Market share of top five companies: **47.2%**

Market share of top ten companies: **78.4%**

Total North American capacity (1986): **3.598 million tons**

B Mill this month at a 450-tpd level. The mill has been shut down since March 1985 because of depressed pulp prices and high operating costs.

During final negotiations, Repap agreed to pay another C$10 million for the assets, raising the total cost of the acquisition to C$110 million, Petty said in a recent newspaper interview. With planned improvements to both the Prince Rupert complex and the Terrace sawmill, total financing will amount to about C$130 million; $75 million is from a loan by British Columbia Development Corp. ■

Speculation abounds on BCFP's future

Turnover of 41.5% of British Columbia Forest Products Ltd.'s ownership to two investment dealers in May continues to breed speculation concerning what's in store for the company. Possibilities include a leveraged buyout or takeover (*P&P*, July, p. 21).

The change in BCFP's ownership began early in May with Alberta Energy Co.'s sale of its 18% stake to Gordon Capital Corp. and Merril Lynch Canada Inc. Shortly afterward, the two companies sold the stock to individual and institutional investors and bought a 26.3% stake in BCFP from Brunswick Pulp & Paper Co., a joint venture between Scott Paper Co. and Mead Corp., as well as another 15.2% share owned by Mead alone.

Since May, Gordon and Merrill Lynch have transferred their holdings into a company called BCFP Holdings Ltd. and have filled Mead's two spots on the board of directors with their own appointees. The new directors are Jean Chretien, former Liberal Party cabinet minister and now consultant with Gordon, and Howard Kellough, a Vancouver, B.C., attorney. ■

MERGER BRIEFS

■ **Scott Paper Co.** has declared a dividend of preferred share purchase rights as part of a plan to defend against "unilateral actions by hostile acquirers" that would deprive holders of fair value.

■ **Pentair Inc.** has agreed to buy McNeil Corp., an Akron, Ohio-based manufacturer of industrial products, for about $83 million. In 1985, McNeil earned $4.4 million on sales of $178.4 million. Pentair had earnings of $20.1 million on sales of $534 million. ■

SALES/EARNINGS

Industry earnings rebound in second quarter

Second-quarter earnings of U.S. paper and forest products companies were up 13.1% on flat sales this year over the same quarter in 1985. This was the first increase in industry profits after four quarters of negative year-to-year earnings comparisons. The upswing was largely attributed to the weakening dollar—improving export shipments and pricing in both overseas and domestic markets—and to cost-control programs now in force at many companies. Further strengthening in pulp and paperboard markets—which were most adversely affected last year by the strong dollar—leads many companies to predict a healthy third quarter.

International Paper Co.'s earnings jumped 103% over second-quarter 1985, living up to hopes expressed last quarter by IP's chairman and CEO, John A. Georges. He said that the lower value of the dollar and strong demand for most of the company's product line led to the big upswing.

U.S. paper/forest products industry second-quarter results.

Companies	Sales	Change 1986/85	Earnings[1]	Change 1986/85
Boise Cascade	$945,090	−0.8%	$31,330[2]	−1.1%[2]
Bowater Inc.	226,509	−1.8	14,762[2]	−3.0
Champion International	1,096,412	−31.4	50,455	−16.4
Chesapeake Corp.	154,472	79.5	2,973	−44.9
Consolidated Papers	165,187	−11.8	24,910	−15.2
Federal Paper Board	211,581	10.6	7,527	538.9
Fort Howard Paper	394,148	5.7	46,767	6.8
Georgia-Pacific	1,930,000	7.8	86,000[2]	28.3
P. H. Glatfelter	73,235	3.6	10,803	2.0
Great Northern Nekoosa	502,100	4.5	−300[2,3]	n.m.
Hammermill Paper	456,181	4.3	22,058[2]	103.9
International Paper	1,230,000	6.9	71,000	102.8
James River (4/27)	693,900	8.0	23,000[2]	−32.4
Jefferson Smurfit	259,114	123.1	6,739	20.6
Kimberly-Clark	1,087,700	8.0	68,800	-13.0
Longview Fibre (4/30)	114,808	4.7	7,172	69.6
Louisiana-Pacific	394,050	14.2	24,540[2]	349.5[2]
Mead Corp.	768,300	6.3	34,600	4.5
Mosinee Paper	48,578	5.3	1,807	−18.2
Pentair Inc.	133,737	0.5	3,779	−42.2
Pope & Talbot	76,128	−10.7	3,623	97.3
Potlatch Corp.	249,878	0.5	19,431	84.3
Scott Paper	829,500	9.0	56,300	6.0
Sonoco Products	246,998	6.8	15,381	13.1
Southwest Forest Industries	158,518	10.1	1,856	50.8
Stone Container	527,850	74.6	3,476	150.3
Temple-Inland	313,500	−4.0	19,300	−20.2
Union Camp	499,400	4.6	28,602	15.7
Wausau (5/31)	57,714	9.0	3,314	37.5
Westvaco	435,747	−0.1	18,647	−18.8
Weyerhaeuser Co.	1,497,396	6.9	68,380	14.6
Willamette Industries	309,810	1.9	19,336	9.6
Total	**$16,087,541**	**−0.1%**	**$796,368**	**13.1%**

1. Income after taxes from continuing operations, excluding most significant nonrecurring items in both years.
2. **Boise Cascade:** Includes $17.8-million pretax gain in year-earlier period from sale of mill. **Great Northern:** Earnings include one-time pretax charge of $41 million from restructuring Great Northern Paper. **Hammermill:** Includes pretax gain of $6.75 million from a contract settlement. **James River:** Includes pretax charge of $4.0 million for consolidatoin of coating operations. **Louisiana-Pacific:** Includes a $2.4-million pretax charge relating to gain on sale of a sawmill and a reserve loss on a venture capital investment.
3. Change in method of accounting effective Jan. 1, 1986, reduced pension costs. n.m. = Not meaningful.

Georges foresees continued improvement if the dollar holds steady.

A more modest improvement of 16.4% over last year's period was turned in by Champion International Corp. This was attributed to "higher profits in wood products and some reduction in overall operating costs." Andrew C. Sigler, chairman and CEO, said he is "particularly pleased with the pickup in uncoated grades. Lightweight publication papers continue to be under considerable pressure, but there has been gratifying progress in all other paper grades, as well as in wood products and packaging." He said the company (still digesting its 1984 purchase of St. Regis Corp.) is "continuing to go ahead with sweeping cost-reduction efforts."

Hammermill Paper Co. had the second-best second-quarter earnings in its history. The company said that its performance was helped by cost containment programs and price improvements for some of its products.

Paperboard going strong. Federal Paper Board Co. reported record sales for the quarter and greatly improved earnings. John R. Kennedy, president of Federal, said the improvement was the result of "selling price increases in both market pulp and bleached paperboard and improved efficiencies at the Riegelwood, N.C., mill and the Augusta, Ga., mill." Kennedy said that bleached board backlogs at both of these mills exceed 35 days, and a further bleached board price increase of 8% to 10% per ton on packaging grades was effective Aug. 1.

Stone Container Corp. returned to profitability in the second quarter after a first-quarter loss. Again, better product prices provided the main thrust. Company president Roger W. Stone observed "industry shipments of corrugated containers increased more than 7% for the quarter and 6% for the first six months. Operating rates for kraft linerboard mills ran at more than 98% in the quarter." Stone plans to increase corrugated container prices by 8% this month.

Chesapeake Corp. said that its net income for the quarter was $3.0 million compared with a first-quarter loss of $2.5 million. The company said that production from its new Tri-Kraft linerboard machine has continued to improve along with linerboard prices. Chesapeake's containerboard division is thriving, with shipments up 9% from a year earlier and more improvement expected this quarter.

Potlatch Corp. also reported sharply higher earnings and said that it expects "generally positive conditions" for the remainder of the year. All of the company's major businesses reported income gains during the first half of the year, and Potlatch's wood products group had its second consecutive profitable operating period.

Tissue still competitive. Kimberly-Clark Corp.'s sales improved by 8% over year-earlier levels, but profits were down partly due to "the cost of new product introduction and extensive promotions" in the highly competitive market for disposable diapers. Scott Paper Co. fared better, with a 6% increase in income and record second-quarter sales. Philip E. Lippincott, chairman and CEO, said improved earnings of Scott's domestic sanitary paper products business and "excellent results" from international subsidiaries fed the record quarter.

James River Corp., which completed its fiscal year on Apr. 27, showed an 8% improvement in earnings for its fourth quarter but recorded a 32.4% loss in earnings. The decline was attributed to "decreased income from consumer tissue and bleached paperboard and continued low prices for consumer tissue.

Wood products much improved. Georgia-Pacific Corp.'s earnings for the quarter were up 28.3% from last year's level. Weyerhaeuser Co.'s sales were up 7%, and earnings were up about 15%. Louisiana-Pacific Corp. enjoyed its third-highest quarterly earnings and its highest quarterly sales in its history. ■

Canadian second-quarter profits increase 126%

Second-quarter earnings of Canadian pulp and paper companies rebounded strongly thanks to healthy demand and improving prices for pulp and some paper/board grades (excluding newsprint), cost reduction programs, and the weak Canadian dollar. A survey of results from 11 Canadian companies shows that aggregate earnings surged 126% from depressed 1985 levels on a 9.6% increase in sales.

MacMillan Bloedel Ltd. reported the largest increase in profits, racking up a 529.5% rise in second-quarter 1986 income vs last year's period (which, in turn, was a ten-fold improvement over the 1984 quarter). The company said its gains reflect higher shipment volumes of lumber, newsprint, pulp, and containerboard, and price improvements for pulp and containerboard. MB also credits its cost-reduction program and higher-value products.

MB's performance was a major contributor to the improved picture for Noranda Inc.'s Forest Products Group, which reported second-quarter 1986 after-tax operating income of $34.9 million, up 1,242.3% from the 1985 quarter. (Noranda's Forest Products Group also includes Fraser Inc., James Maclaren Industries Inc., and major holdings in Northwood Pulp & Timber Ltd.)

Canfor Corp.'s CEO, Peter Bentley, attributed the company's turnaround to continued reductions in manufacturing and distribution costs plus

Canadian paper/forest products industry second-quarter results.

Companies	Sales	Change 1986/85	Earnings[1]	Change 1986/85
Abitibi-Price	C$701,700	5.9%	C$24,600	15.5%
British Columbia Forest Products	324,200	11.8	20,000	181.7
Canfor Corp.	288,800	−6.1	11,200	n.m.[2]
Consolidated-Bathurst	515,200	15.7	24,900	2.9
Crown Forest Industries	242,500	11.4	10,500	133.3
Domtar Inc.	574,300	8.9	29,100	55.6
Donohue Inc.	114,400	8.4	4,200	0.0
Great Lakes Forest Products	164,580	12.1	5,557	n.m.[2]
MacMillan Bloedel	698,700	16.8	49,100	529.5
Rolland Inc.	82,084	7.7	1,883	53.7[2]
Scott Paper Ltd.	64,626	2.0	3,299	23.8
Total	**C$3,771,090**	**9.6%**	**C$184,339**	**126.4%**

1. Income after taxes from continuing operations, excluding most significant nonrecurring items in both years.
2. **Canfor:** 1985 quarter reported as loss; **Great Lakes:** 1985 quarter reported as loss; **Rolland:** 1985 first-quarter income excluding extraordinary gain from sale of property.

n.m. = Not meaningful.

continued strengthening in pulp and paper prices. Canfor reported lower second-quarter 1986 sales but a big improvement in earnings, racking up a net income of $11.2 million compared with an $8.6-million net loss in 1985.

Speaking for newsprint producer Abitibi-Price Inc., Bernd K. Koken, the company's CEO, said that newsprint and groundwood papers should benefit from strong U.S. consumption and the Oct. 1 price increase, but "highly competitive markets continue to be the norm" in most of Abitibi's businesses.

Domtar Inc.'s pulp and paper products group increased operating profits compared with 1985, when results were hurt by a strike. But Domtar also said "operating profit of the packaging group was significantly lower than in the 1985 quarter, as highly competitive markets lowered selling prices for containerboard and corrugated containers."

Rolland Inc. noted that "selling prices of fine paper are firming up because of cost pressures, but market conditions are still highly competitive." Rolland continues to "emphasize improvement in product mix and cost reductions in order to maintain profit margins at current levels." ■

CAPITAL SPENDING

U.S. paper companies to up spending by 6.7% in 1986

Contrary to U.S. business as a whole, pulp and paper companies are raising their capital spending plans for 1986, according to the latest Commerce Dept. survey done in April and May.

Paper companies are now planning to boost outlays for new plant and equipment by 6.7% to a new total of $9.1 billion for 1986, up from $8.53 billion in 1985. This would be up from a 3.8% increase projected by the Commerce survey conducted in January and February. This is also closer to the 7.8% increase to $9.2 billion reported by McGraw-Hill's spring survey (*P&P*, July, p. 25).

On a quarterly basis, U.S. paper industry capital spending is expected to rise each quarter from $8.63 billion in the first quarter to $8.97 billion in the second quarter, $9.19 billion in the third quarter, and $9.59 billion in the final quarter of 1986, according to the latest Commerce Dept. survey. ■

EXPANSIONS

SFI offering to fund Panama City upgrade

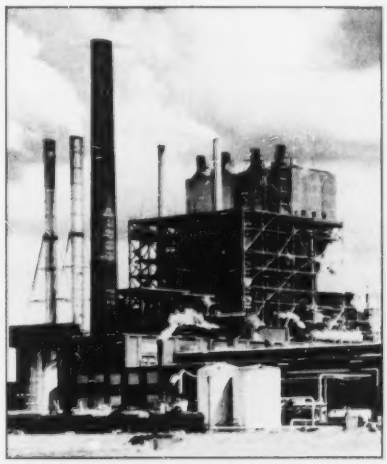
Southwest Forest Industries Inc. will use the proceeds of a public debenture offering to begin a major modernization at its 790-tpd kraft linerboard and 680-tpd bleached kraft market pulp mill in Panama City, Fla., the company announced. The $65-million program will concentrate on the linerboard machine, pulp mill, and woodyard, and it will take about two years to complete.

Panama City's single linerboard machine will be modified to use recycled fiber, adding about 200 tpd to capacity. Other plans include a new digester system for the pulp mill to improve fiber yield for linerboard production and a woodyard upgrade to allow processing of treelength logs.

SFI began studying the Panama City modernization in 1984. Preliminary engineering plans were completed in 1985, but the project was then put on hold due to poor markets for the mill's products. Scaling back oil consumption was a major emphasis of the original program, but the drop in oil prices led the company to refocus the modernization.

Funding for the project will come from a public offering of $135 million of subordinated debentures due Sept. 1, 2001. The offering, expected to close during the third quarter, will also help reduce bank debt and provide capital for improvements at other facilities. Merrill Lynch Capital Markets is the sole underwriter of the offering.

In addition to modernizing Panama City, SFI would also consider the possibility of integrating its market pulp production, chairman and CEO W.A. Franke told attendees at the company's annual meeting early this year. He said that the company would continue to look at the possibility of expanding its corrugated box manufacturing capacity to consume more of its linerboard production.



Strategic restructuring. The proposed debenture offering is the latest step in SFI's move to strengthen its financial condition. To reduce its interest payment burden, the company recently completed an offer to holders of its 10% convertible subordinated debentures to exchange each $1,000 principal amount for 82 shares of SFI common stock. As a result of the offer, the company said that it would incur a noncash, one-time charge of $6.7 million in the second quarter. A preliminary estimate is that $26.1 million of $40 million in debentures outstanding were tendered for 2.14 million shares.

The company recently completed the sale and leaseback of its nine corrugated box plants to Covington Capital Corp. for $23 million in cash and a $3.5 million note (*P&P*, Feb., p. 27). This followed the sale of its Knox Lumber retail building material distribution subsidiary in April for $27.5 million and the sale of 6,500 acres of timberland to a timber trust. ■

Menasha proceeds with upgrade at Otsego mill

Menasha Corp.'s mill located in Otsego, Mich., has broken ground for a $2.85-million warehouse and office complex as part of a $26-million expansion begun in 1980 and scheduled for completion in the fall of 1987.

The two-machine Otsego mill currently has capacity to produce 550 tpd of corrugating medium, and the improvements will add another 100 tpd by the end of next year. A new KMW press section has been installed on No. 1 machine, increasing speed to 2,500 fpm. A new d.c. digital drive system has also been added to No. 1, and improvements to the fourdrinier are slated. A computerized control system was added to the pulp line. ■

ISSUE FOCUS: PREVENTIVE MAINTENANCE **ENGINEERING**

P&P SURVEY DISCOVERS EMPHASIS ON PREVENTIVE MAINTENANCE HAS GROWN

Responses from 102 North American mills indicate more planning, greater use of computers, and better utilization of contractors

By **KENNETH E. SMITH, Executive Editor, and BRENT A. CARPENTER**

In June, survey questionnaires were sent to a variety of maintenance engineers and managers in the North American pulp and paper industry asking for information on maintenance practices at their mills. Names were taken from *P&P*'s Pulp & Paper Industry Personnel Census. Responses represented a total of 102 mills producing all major grades of pulp and paper products. Production capacities of these mills ranged from 7,500 to 827,000 tpy. Responses were tabulated and are reported by region in Table 1. (All responses are given in short tons.)

As expected, mills in the U.S. South averaged the greatest annual production capacity, and mills in the U.S. Northeast averaged the least. Mill size did not necessarily correspond to modernity, however, as mills in both the South and Northeast had their most recent paper machine modernization in 1980, on average (Table 1, section A.)

Mills in Canada were the least modern, with the last paper machine modernization occurring in 1977. Canadian mills were also the least productive on a per ton basis in both overall labor hours and maintenance labor hours. Canadian mills required 1.58 maintenance labor hours per ton compared with only 0.69 maintenance hours per ton in the U.S. Midwest, which was the most efficient in terms of maintenance productivity (Table 1, section H).

Not coincidentally, 75% of all midwestern mills report that they conduct regular maintenance force productivity evaluations (Table 1, section B). Canada and the U.S. Northeast, the two least productive maintenance areas, are also the least likely to conduct productivity evaluations (only 47% of all mills in these regions conduct evaluations).

WORK PRACTICES. In addition to mill modernity, work practices are obviously a factor in determining maintenance work force productivity. All Canadian mills reported unionized maintenance work forces (Table 1, section D). Only 13% of Canadian mills reported that flexicraft or multicraft work rules are in effect. Canadian mills averaged 11 maintenance job classifications, and only 20% of Canadian mills reported that operators could do some maintenance work.

In contrast, work practices at southern mills are the most flexible. About 80% of southern mills report unionized work forces. Southern mills average only five maintenance job classifications, and operators can do some maintenance work at 60% of these mills. Flexicraft or multicraft work rules are in effect at 86% of southern mills.

Mills in the Northeast averaged the lowest paper machine availability at 87%, despite reporting the second highest maintenance labor hours per ton of production (Table 1, section B). Availability is generally defined as total available production time (other than downtime required by contract or market-related reasons) minus time lost due to maintenance-related causes (planned and unplanned) divided by total available production time.

Some mills may, however, calculate this figure differently and include all downtime in the calculation. For this reason, respondents were asked to report percent of downtime caused by unplanned equipment failures. These figures ranged between 3% (Canada) and 7% (U.S.

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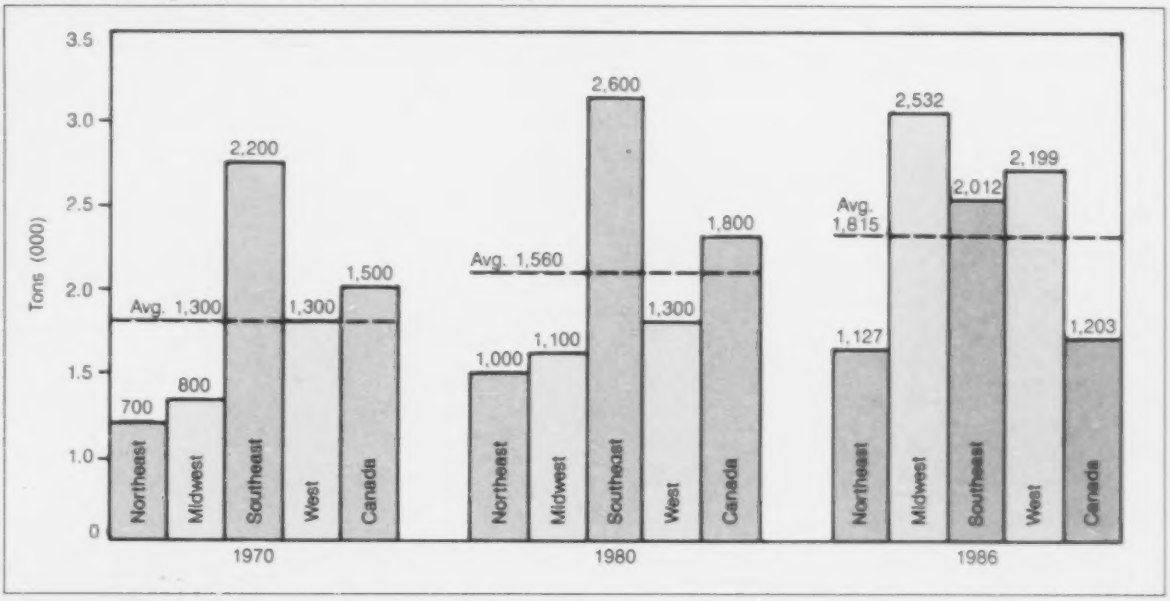
South). All regions report that most maintenance work is planned, with a low of 55% (West and Northeast) to a high of 79% in the South. Not surprisingly, 97% of all southern mills report that planners assist maintenance foremen in scheduling maintenance work, with only 53% of western mills using planners.

TABLE 1: **Survey data summary.**

	Northeast	Midwest	South	West	Canada
A) Mill data					
Mills responding	15	25	28	18	15
Annual production (short tons)	182,643	349,484	382,272	246,268	267,023
Last paper machine modernization	1980	1979	1980	1979	1977
Total employees	770	732	816	420	838
Total maintenance employees	162	138	190	112	222
Total maintenance supervisors	18	12	18	10	21
Total maintenance mechanics	124	119	170	96	156
Maintenance labor hours/year	250,367	240,081	359,037	186,290	421,724
Overtime maintenance labor hours/year	30,450	28,945	41,191	19,507	46,899
Days/year of mill operations	355	354	357	352	345
B) Maintenance effectiveness					
Papermachine availability	87%	94%	94%	93%	93%
Pulp mill availability	90%	95%	95%	93%	94%
Percent unplanned downtime due to equipment failure	6%	6%	7%	4%	3%
Mills that analyze downtime causes	73%	79%	86%	61%	87%
Mills where unplanned failures increased since 1980	20%	9%	0%	6%	16%
Mills conducting maintenance force productivity evaluations	47%	75%	64%	67%	47%
Percent of maintenance work that is planned	55%	67%	79%	55%	58%
Mills with planners assisting maintenance foreman	80%	80%	97%	53%	100%
Mills where maintenance dept. is involved in planning expansions/modernizations	80%	80%	93%	76%	85%
C) Outside contractors					
Percent maintenance budget spent on outside contractors	12%	11%	20%	15%	11%
Mills planning to increase outside contractor use in 1987	60%	42%	25%	17%	23%
Mills that maintain own process control	67%	88%	85%	80%	92%
D) Maintenance work force					
Mills with unionized maintenance forces	93%	96%	80%	88%	100%
Mills with flexicraft or multicraft work rules	53%	50%	86%	60%	13%
Average number of maintenance job classifications	8	8	5	7	11
Mills where operators can perform some maintenance	27%	42%	60%	56%	20%
E) Training					
Average hours/year training for each mechanic	36	45	32	39	34
Average hours/year training for each E/I person	66	64	55	58	48
F) Computerized maintenance					
Mills with computerized work order systems	53%	48%	86%	73%	85%
Mills with computerized spare parts ordering/inventory	67%	84%	90%	73%	77%
Mills with computerized downtime analysis	40%	24%	14%	7%	38%
G) Preventive maintenance					
Mills with a "formal" preventive maintenance program	53%	79%	87%	88%	87%
Percent maintenance budget to preventive maintenance	9%	18%	12%	19%	22%
Average number of preventive maintenance inspectors	3	4	7	5	4
Mills with permanently installed condition monitoring	7%	33%	48%	46%	50%
Unplanned downtime reduction attributed to preventive maintenance system	26%	17%	35%	20%	18%
H) Data evaluation					
Production tpy/maintenance employee	1,127	2,532	2,012	2,199	1,203
Percent maintenance employees/total employees	21%	19%	23%	27%	26%
Maintenance supervisors/100 mechanics	15	10	11	10	13
Maintenance labor hours/ton of production	1.37	0.69	0.94	0.76	1.58
Percent overtime maintenance labor hours	12%	12%	11%	10%	11%

FIGURE 1: **Tonnange responsibility of maintenance employees.**



PREVIOUS SURVEY. In 1980, *Pulp & Paper* conducted a maintenance survey (*P&P*, Dec. 1980, p. 108) that showed spending on outside contractors averaged 11% of maintenance budgets by mills in all regions. The current survey shows that spending by all mills on outside contractors averaged 14% (Table 1, section C). The South led the way in this area with an average of 20%—possibly due to more flexible work rules and less unionization. Canada and the Midwest (the most strongly unionized areas) reported the least spending on contractors at an average of 11%. Sixty percent of all northeastern mills plan to increase spending on outside contractors in 1987.

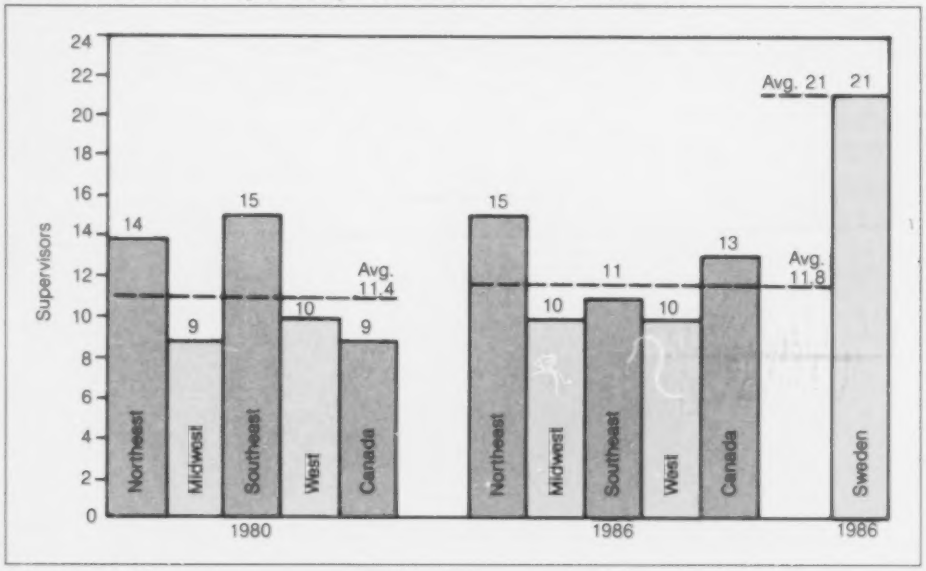
Figure 1 shows the tonnage responsibility of each maintenance employee for all regions in 1970 and 1980 (from the 1980 maintenance survey) as well as figures from the 1986 survey. Generally, maintenance employees in all regions have become more productive except in Canada and the Southeast. Tonnage responsibility per employee for all mills in 1986 averaged 1,904 tons.

The 1980 survey showed an average of 11 supervisors per 100 hourly maintenance mechanics. The 1986 sur-

TABLE 2: **Swedish mill data summary.**

	Korsnäs-Marma AB Gävle, Sweden	Billerud Uddeholm AB Gruvöns Bruk, Sweden	Svenska Cellulosa AB-Ortviken Sundsvall, Sweden	Svenska Cellulosa AB-Östrand Sundsvall, Sweden
Annual production (short tons)	545,000	597,000	594,000	402,000
Paper machine availability	88%	84%	86%	94%
Days/year of mill operations	342	355	349	353
Products	Linerboard Bleached board Bleached pulp	Medium Linerboard Bleached pulp	Newsprint	Bleached pulp CTMP pulp
Total mill employees	1,330	1,280	905	600
Total maintenance employees	440	390	249	250
Total maintenance labor hours/year	697,000	563,300	351,000	324,000
Maintenance labor hours/ton	1.28	0.94	0.59	0.81
Percent maintenance employees/ total employees	33%	30%	28%	42%
Supervisors/100 maintenance mechanics	18	18	20	26
Percent maintenance budget spent on outside contractors	29%	39%	20%	20%
Total maintenance costs ($/ton)	$29.24	$23.24	$18.32	$28.00

FIGURE 2: **Maintenance supervisors per 100 maintenance mechanics.**



vey found that average was holding steady for all mills. By region, the Northeast uses the greatest number of supervisors per 100 mechanics (15), and the West and Midwest use the least (10) (Figure 2).

Computers are increasingly being applied to maintenance applications. The majority of mills in all regions have at least a computerized spare parts inventory/ordering system and probably have a computerized work order system (Table 1, section F). Respondents without computer systems in their maintenance department indicate that implementing a system is a high priority. Computer systems seem to be most widespread in the South, with 90% of mills reporting some type of system.

PREVENTIVE MAINTENANCE. In the area of preventive maintenance, Canadian mills are doing the best job (Table 1, section G). Eighty-seven percent of Canadian mills reported preventive maintenance systems and spent an average of 22% of their maintenance budgets on preventive maintenance. Fifty percent of all Canadian mills said that they have permanently installed condition monitoring systems. Not surprisingly, Canadian mills report the lowest amount of downtime due to unplanned equipment failures (3%). Unplanned downtime reduction attributed to preventive maintenance programs by mills that have them ranged from 17% to 35%.

Table 2 presents data from four Swedish pulp and paper mills for comparison. These Swedish mills spend an average of 27% of their maintenance budgets on outside contractors vs 14% for North American mills. This could account for the high maintenance productivity figures for these mills (0.59 to 1.28 labor hours per ton) since these figures account only for mill maintenance labor.

Also, maintenance workers average 32% of the total mill work force at these Swedish mills compared with an average of 23% for North American mills surveyed. Supervisors per 100 mechanics at Swedish mills averaged 21—significantly higher than North American mills. Could this account for the seemingly higher maintenance productivity of Swedish mills?

RESPONDENT COMMENTS. Comments received from respondents addressed a number of mill maintenance concerns. Many respondents feel that maintenance is not given the support and priority that they feel it deserves. A southern manager said, "Maintenance management is becoming more 'scientific' in its approach as the maintenance department moves from a 'fix it' cost center to a 'preventive' income-protecting center. Most production-oriented people do not really understand this [potential] or maintenance in general." Echoing this theme, another southern manager said, "organized, planned maintenance is the best profit source in the mill. The maintenance system governs machine availability, safety success, product quality, and greatly influences mill profit." A Canadian noted, "Maintenance is considered a necessary evil rather than an investment."

Other respondents commented on the need for greater cost control and planning in mill maintenance. "We are placing greater emphasis on training and control techniques. A full-scale computerized vibration program is being started." Another said, "The general level of maintenance [at our mill] has improved with the implementation of a formalized planning and computer system. To have effective maintenance, an organized disciplined approach to the tasks in mandatory." ■